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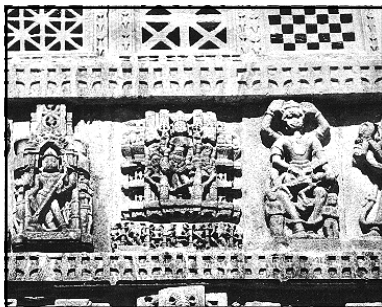
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“Combined with rising public interest in this sector, growing investment by traditional business houses, tax incentives and the significant foreign investment available, the Indian biotechnology sector is poised to emerge as a significant force on the global biotech map.”

— Ernst & Young

Biotechnology in India A Promising Future

After becoming an IT bellwether, India is now shifting its focus to the most promising industry of the future, Biotechnology. With its large pool of scientific talent, world-class information-technology industry, and vibrant pharmaceutical sector, India is well positioned to emerge as a significant player in the global biotech arena.

Biotechnology is perceived as a revolution throughout the world. Scientists, through Research and Development (R&D), have developed and are continuing to develop cures for diseases that have affected people for decades and even centuries. Scientists recently, have also, clinically developed crops that can withstand the brutalities of weather changes, helping poor farmers of the developing countries to retain their yield and increase their output manifold. Biotech, considered a boon by some, provides great hope to many around the world, and its benefits are and will be realized by more and more people over the years.

On the threshold of this new revolution, numerous companies have sprung up to take a piece of the exponentially growing Biotech market worldwide. The ever-decreasing physical boundaries enable biotech companies from the West to tap large markets around the world.

India to this extent holds a good advantage over many other countries of the world. With its large population of over a billion people there is a huge market for products and services. India's population has a very interesting demography that creates almost a perfect environment for biotech companies to shift bases here. In addition the Indian sub-continent, which occupies only 2.4% of the total global surface area, has the most varied species of flora and fauna. A study shows that, in percentage terms, India has about 7.6% of total mammal species, 12.6% of bird species, 11.7% of fishes and roughly 6.0% of total flowering plants that are present in the world. Biotech companies, by moving to India, can utilize this immense Bio-diversity, can easily find samples and, also conduct field research much more efficiently. Adding to this, India has one of the largest agriculture sectors in the world, and varied climatic zones that can help in research and development of different agribiotech products applicable worldwide.

(Continued on page 2)

Indian Advantage:

India, today, holds a small share of the global biotech market, but has all the capabilities to become a dominant player. The consumption of biotech products in India is expected to quadruple in the next decade. The human and animal segment of the industry alone is growing by at least 20%.

India has a rich human capital, which is the strongest asset for this knowledge-based industry. India has a large English speaking base and, according to Confederation of Indian Industry estimates, produces roughly 2.5 million graduates in IT, engineering and life sciences, about 650,000 postgraduates and nearly 1500 PhDs qualified in biosciences and engineering each year. India has proved its competency in selected areas of biotechnology such as, to name a few: capacity in bioprocess engineering, skills in gene manipulation of microbes and animal cells, capacity in downstream processing and isolation methods, and its competence in recombinant DNA technology of plants and animals. India has also allowed assisted stem cell research that permits researchers to use embryos from fertility clinics upon informed consent of the donors, thus giving it a clear head start in this new and promising field in Biotech. Clearly, India has the strength and capabilities in this industry, and a definite advantage to forge ahead and become the chosen location for many biotech companies looking for large markets and low cost qualified manpower to work in their R&D division.

(Continued on page 3)

India's Biotech Industry: Segment Review

The Indian Biotech industry can be divided into different segments. Following is a review of largest and the fastest growing segments of the Biotech industry in India.

Medical Biotech Segment

- The Indian pharmaceutical market is growing very rapidly. According to a study by Mckinsey, Indian Pharma industry is expected to grow to an innovation-led US \$25 billion industry by 2010 with a market capitalization of almost US \$150 billion from the current US \$5 billion generic based drug industry. The vaccine market is expected to grow by roughly 20%.

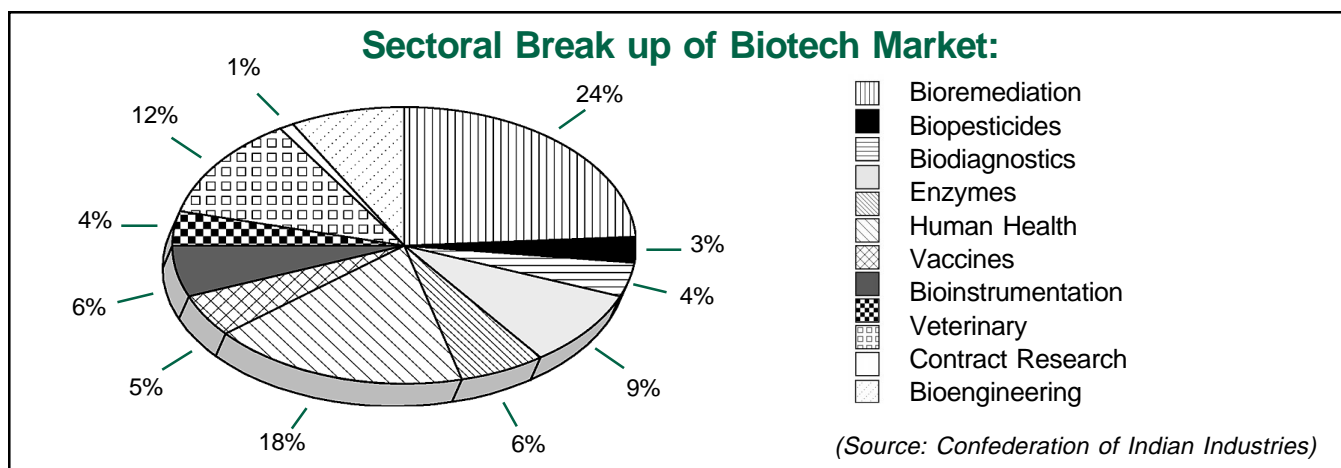
Agri Biotech Segment

- India being the second largest food producer, offers a huge market for biotechnology products, especially agribiotech products.
- India has an excellent scientific infrastructure in agriculture, rich bio-diversity and skilled and low cost human-power.
- In a report by Ernst & Young it is expected that the Nutraceuticals market is roughly US \$532-638 million presently and growing.
- With its 8000 kilometer of coastline including Andaman & Nicobar and Lakshwadeep islands, India has a rich aqua culture and its Marine resource development holds great potential.

Services Segment

- With increasing number of pharmaceutical companies finding it difficult to conduct entire drug discovery process-in-house they are looking for ways to minimize costs. India has become a very attractive base as the cost of infrastructure is relatively lower compared to other nations.
- Foreign companies also benefit from cheaper qualified workforce available in India.
- India produces enough qualified graduates each year thus companies looking to expand their operations can easily do so without facing a shortage in labor.

Biotechnology in India (Continued from page 2)



It is estimated that vaccines, contract research, agriculture and human health sectors comprise as much as two thirds of the total market. It is further estimated that health care products would dominate the Indian biotech market, roughly 40% of the total market by the year 2010 followed by agriculture of about 30%. It is also estimated that contract research and bioinformatics would pick up and account for as much as 25% of the biotech market. An estimation by CII shows that the Agri-Biotech would see growth rates of as much as 60%, Diagnostic and Therapeutics of about 25% and Vaccines of about 15%. These figures clearly indicate the prospects of the Biotech industry in India.

Government and State Initiatives

The Government of India realized the potential and benefits of this industry at an early stage and formed the Department of Biotechnology in 1986 that has now become the central agency, responsible for policy, promotion of R&D and for international cooperation and manufacturing activities. Some of the initiatives taken by the Government of India are as follows:

- The Government of India has been increasing its outlays to provide financial support to this industry. Government of India is also setting up a venture capital fund, to support small and medium enterprises.
- Good regulatory framework has been set up for approval of GM crops and rDNA products. Recently, the Government of India decided to make changes to the Drugs & Cosmetics Act to make it more globally compatible.
- Indian Patents Bill recently passed by the Parliament allowing 20-year patent term, inline with provisions made by WTO and TRIPS.
- India has a sound and widely acknowledged framework of bio-safety guidelines to deal with evaluation, monitoring and release of genetically engineered organisms and there are more than 106 institutional bio-safety committees.

The initiatives taken by both Central government and State governments have given a big boost to the Biotech industry in India. Foreign companies looking for new markets and to expand facilities to much more economical locations can find India ever more open and responsive to their needs.

Some useful websites for further information are:

- Department of Biotechnology: <http://dbtindia.nic.in>
- Confederation of Indian Industries: www.ciionline.org
- Government of Andhra Pradesh: www.andhrapradesh.com
- Federation of Indian Chambers of Commerce: www.ficci.com
- US-India Business Council: www.usibc.com

State Level Initiatives

Many state governments have also realized the benefits/importance of this industry. State governments namely Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra have begun to formulate their policies, develop R&D centers to encourage and nurture the Biotech industry. Following is a brief outline of some of the initiatives taken by a few state governments:

Andhra Pradesh

- Government of Andhra Pradesh, in collaboration with the ICICI Limited, has set up a knowledge Park near Hyderabad.
- Development of 'Genome Valley' and Biotech Park with state-of-the art features.
- The Government has initiated many business friendly policies such as 'Single Window Clearance' mechanism geared to relieve the problem of red tape.

Tamil Nadu

- The Government of Tamil Nadu is facilitating in the setting up of the biotechnology enterprise zones (biovalleys) along the lines of Silicon Valley to exploit the bio resources of the state.
- Four state-of-the art biotech parks, a bioinformatics and genome center will be established, each of which would be leveraging the bioresources of the agro-ecological zones of Tamil Nadu.

Maharashtra

- Has an excellent intellectual infrastructure. Through nearly 1000 institutions, it produces around 163,000 trained technical personnel each year. Some of the best Centers of excellence in India are present in Maharashtra.
- The government is also promoting biotech parks, R&D centers, and pilot plant facilities for underway contract research by putting equity stakes in such projects.

Karnataka

- The Karnataka government has announced a biotech policy to promote this sector and is setting up an institute for bioinformatics in Bangalore.
- In addition the state government is also creating a biotechnology fund that will have inflows from the biotech companies. This could be used for incubation of new projects and promotion of the sector in the state.
- Karnataka has planned to launch India's first state sponsored biotechnology venture capital fund to boost their initiatives.

Himachal Pradesh

- Himachal Pradesh has prepared a blue print for promotion of biotechnology industries in the state which includes setting up of biotechnology parks, conservation and exploitation of bio-resources, intensification of R&D, and promoting biotechnology entrepreneurship through tax concessions and relaxed labor laws.
- It is also proposed to provide research based support to the private companies in form of providing for instance, access to a data base of bio-resources which is being developed along with separate entries of endangered medicinal plants.
- The State government has recently announced 100% tax holidays for all biotechnology products up to the year 2012.

Monsanto – A Success Story



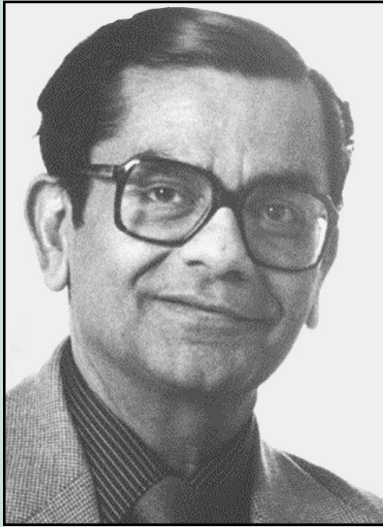
(Monsanto Laboratory IISc Campus Bangalore)

Monsanto began its operations in India over 50 years ago, soon after India got its independence. Monsanto has since then established many development centers in different areas such as Silvassa near Gujarat and a factory in Lonavla focusing on production of weedicides. Monsanto has also set up a unit at the biotechnology research center of world-renowned Indian Institute of Science in Bangalore. The company has been able to successfully utilize India's strong knowledge base and its varied natural resources to develop numerous agribiotech products used worldwide including the United States and Europe. Monsanto over the course of its operations has successfully developed agribiotech products such as Machete, a rice herbicide, Lasso and Roundup for weed control and Leader, which is a new generation herbicide. Monsanto recently launched genetically modified seeds for the cotton industry, which attempts to increase the yield manifold and decrease the use of pesticides. The results for the new genetically modified cotton have been encouraging. Monsanto's chief strength has been its focus on the fast-growing herbicides segment thanks to the leadership status enjoyed by its parent in this segment. Monsanto has been able to realize financial benefits from its base in India. The Indian subsidiary of Monsanto, recently reported growth rate of almost 65% as of June 30th, 2002 and its net profits rose by over 60% for the year ending March 31st, 2002.

Upcoming Events:

- **International Conference on Biotechnology – “Biotechnology: Initiating Global Linkages”:** 27-29 January, 2003, New Delhi
- **Biotech India 2003:** 5-8 February, 2003, Pragati Maidan, New Delhi
- **Nasscom 2003 Annual Conference:** “Leveraging Knowledge Capital for Enabling Growth”: 11-14 February, 2003, Mumbai

Trail Blazers



JAGDISH BHAGWATI

Professor of Economics and Political Science
Columbia University

Jagdish Bhagwati, a University Professor at Columbia University, was born in 1934 and raised in India. He attended Cambridge University where he graduated in 1956 with a first in Economics Tripos. He then studied at MIT and Oxford, returning to India in 1961 as Professor of Economics at the Indian Statistical Institute, and then as Professor of International Trade at the Delhi School of Economics. He returned to MIT in 1968, leaving it twelve years later as the Ford International Professor of Economics to join Columbia. Until 2001, he used to be Arthur Lehman Professor of Economics and Professor of Political Science at Columbia. Professor Bhagwati has also served as Economic Policy Advisor to Director-General, GATT (1991-1993) and as Special Adviser to the UN on Globalization (Source: Columbia University) (2001). Currently, he is an External Adviser to the WTO.

Professor Bhagwati has published more than two hundred articles and forty volumes. Regarded as one of the foremost international trade theorists of his generation, he has also made contributions to development theory and policy, public finance, immigration, and to the new theory of political economy. Three *festschrift* volumes of essays in his honor have been published in the USA, the UK, and the Netherlands.

Five volumes of his collected scientific essays have been published by MIT Press to date. His early books, *India: Planning for Industrialization* (with Padma Desai, 1970) and *India* (with T.N. Srinivasan, 1975) are acknowledged to have provided the intellectual case for the economic reforms now underway in India. His recent book, *India in Transition: Freeing the Economy*, was published in 1993 by Clarendon Press, Oxford. Among his books are: *Protectionism* (1988), an international bestseller in several languages, and *The World Trading System at Risk* (1991), both reviewed extensively in the United States and abroad.

Professor Bhagwati has received many prestigious awards, some of which are listed below: Frank Siedman Distinguished Award in Political Economy: 1998, Freedom Prize (Switzerland): 1998, Kenan Enterprise Award (USA), Bernhard Harms Prize (Germany), Padma Bhushan (India): India's second-highest award.

He works with several NGOs in the US and India. He is on the Academic Advisory Board of Human Rights Watch (Asia) and was a member of the Advisory Board of the Council on Economic Priorities Accreditation Agency (which has created the SA 8000 Standard for Corporate Social Accountability). He is also the Chairman of the International Advisory Board of the CUTS (Consumer Unity and Trust Society) Centre for International Trade and Economics, a prominent International NGO working on trade and development issues.

Economic Update

Food grains Stocks: Stocks of food grains as on 1st October 2002 stood at 51.41 million tonnes, which was lower by (Million Tonnes) 11.8 per cent than the level at 58.28 million tonnes as on 1st October 2001.

GDP Growth: The economy grew at 5.8 per cent in the second quarter of the financial year ending March 2003 against 5.3 per cent in the corresponding period last fiscal. The following sectors logged significant growth in the July-September 2002-03 period included mining and quarrying (5.1%), construction (7.2%), trade, hotels, transport and communication (8%) and electricity (4.9%). First quarter figure show that the economy grew at 6.0 percent compared to 3.5 percent for the same period last year.

Industrial Production: The overall growth rate of Industrial production during April-September, 2002-03 was 5.2 percent as compared to 2.4 per cent in April-September, 2001-02. The growth in mining & quarrying, manufacturing sector and electricity generation during April-September, 2002-03 was 6.5%, 5.3% and 3.4% respectively as against (-) 0.4%, 2.5% and 3.2% in April-September, 2001-02. As per the use-based classification, production in intermediate goods during April-September, 2002-03, registered lower increase while basic goods, capital goods and consumer goods registered higher increase compared with April-September, 2001-02.

Infrastructure Industries: The six core infrastructure industries registered significant improvement in April-September, 2002-03 as compared to April-September, 2001-02. During April-September, 2002-03 average growth rate was 6.0 per cent as compared to an increase of 1.5 per cent in April-September, 2001-02.

Money Supply: During the current financial year (i.e., March 31, 2002 to October 18, 2002) money supply (M3) increased by 10.6 percent, which is higher than 8.5 per cent, recorded in the corresponding period of 2001-02. Among its components, currency

with the public showed a growth of 6.4 per cent as against 6.8 per cent in the corresponding period of last year. Demand deposits with banks showed an increase of 2.4 per cent as against a decline of 1.4 per cent in the corresponding period of last financial year. Time deposits, with banks increased by 12.8 per cent as against 10.7 per cent in the corresponding period of last year. The annual growth of M3 as on October 18, 2002 stood at 16.4 per cent.

Foreign Trade: Exports increased by 13.5 per cent in dollar terms in April-September, 2002 compared to a decline of 1.2 per cent in April-September, 2001. Imports increased by 8.5 per cent as against an increase of 2.3 per cent in corresponding period of last year.

FDI Inflow: The consolidated figure of FDI inflow for the months April-September is US\$1.69 Billion, which show a significant increase from the same period last year.

Foreign Exchange Reserves: Forex reserves (excluding Gold & SDRs) stood at \$61.23 billion at the end of October 2002.

Exchange Rates: The average market exchange rate of the Rupee during October 2002 appreciated against US Dollar, Japanese Yen and Euro and depreciated against Pound Sterling compared to average market rate during September, 2002. Both NEER and REER moved up in October 2002 as compared with September 2002.

Rate of Inflation: The annual rate of inflation based on Wholesale Price Index (WPI) stood at 3.14 per cent for week ended November 2, 2002 compared to 2.46 per cent a year ago. This rate was contributed by an increase of 2.76 per cent in Primary articles, 4.82 per cent increase in Fuel, Power and Lubricants and 2.70 per cent increase in Manufactured Products as against an increase of 3.03 per cent, 4.50 per cent and 1.48 per cent respectively, on the corresponding date of last year.

NEWS BRIEFS

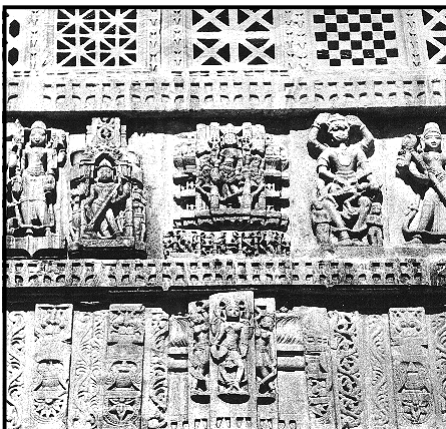
- **Confederation of Indian Industries** along with US based Biotechnology Industry Organization and Pharmaceutical Research and Manufacturers of America has launched the first ever US-India Biotech alliance. The US is continuing to realize the immense potential of India in fields of IT and Biotech and is thus quickly forming alliances that would provide a platform for coordination between companies from the US and India. – *USIBC*
- **Network Associates Inc.**, a California based company that makes software to stop computer viruses and manages computer networks, said on Wednesday it would more than double its Indian engineering staff to 200 by the end of 2003. The company currently employs 70 personnel in its R&D centre. Company officials told a news conference the bulk of the new staff would work for its Sniffer Technologies unit, which makes products to help companies check for abuse of their networks through activities like downloading of music from the Internet. The company is planning a total investment of \$10 million to offer engineering support, quality assurance and testing services. – *Reuters*
- **Hughes Software Systems**, part of the Hughes Electronics Corp, the top U.S. satellite television operator, is expanding its recently launched back-office business unit by hiring more people and extending the range of services offered, a senior official said. The company, which launched its 40 people-strong center last month, aims to scale it up to 200 in the near-term, Arun Kumar, president and managing director of Hughes told Reuters, without giving an exact time-frame. “We have taken a separate facility for this, which is capable

of accommodating about 500 people,” he said. The back-office unit offers technical support to its parent company’s Direcway service, which provides high-speed Internet access via satellite to more than 160,000 subscribers. – *Reuters*

- **Mentor Graphics**, an Oregon based company, maker of software that helps design microchips, plans to invest \$50 million to boost research and development in India, company officials say. About two-thirds of the planned investment over five years will be made in the company’s R&D center in Hyderabad, Walden Rhines, chief executive officer of Mentor, told reporters late on Tuesday. Mentor Graphics also has development facilities in Noida, a satellite township on the outskirts of New Delhi. Rhines said, “We have identified Hyderabad, our largest R&D center outside of the United States, as a strategic technology center for Mentor’s future products and operations.” The number of engineers at the Hyderabad center will be doubled from the current 100 over five years, company officials said. Mentor, which set up shop in the city in 1997, has already invested \$20 million in the center, they said. – *Reuters*
- Canadian software maker **Pivotal** has set up a development and support center in Bangalore where it plans to employ up to 200 people by the end of next year a senior official said. “Virtually, all of our competitors have already moved, or (are) in the process of moving a part of their research and development operations offshore,” Jesper Andersen, executive vice-president of products at the Vancouver-based firm, said by e-mail. “So from a competitive perspective this is an important element of our corporate growth strategy,” he said. Pivotal, which makes software that lets companies analyze customer needs, will use its Bangalore facility for research and development and technical and sales support. – *India Times*

NOTE: This newsletter can also be seen at:
<http://www.indianembassy.org>
<http://www.indiaserver.com>

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